

AIX

# HP StorageWorks Auto Path for AIX installation guide

product version: 04.40-/B

tenth edition (November 2004)

part number: B7949-96009

This guide is a supplement to the *Hitachi Dynamic Link Manager User's Guide* and describes how to install and configure Auto Path for AIX with HP disk arrays.



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Printed in the U.S.A.

*HP StorageWorks Auto Path for AIX: Installation Guide*

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# Contents

About this guide	5
Intended audience	5
Disk arrays	5
Related documentation	6
Conventions	6
Getting help	7
HP technical support	7
HP storage website	8
HP authorized reseller	8
Revision history	9
Warranty statement	10

## 1 Installation 13

Installing Auto Path in AIX environments	14
System prerequisites for using the Auto Path software	15
Disk array firmware and software dependencies	15
Installation procedure	16
Upgrading to version 04.40-/B	21

## 2 Operation 25

Setting the automatic failback feature using the <b>dlnkmgr</b> command	26
Error indication on the last path	27
Using the <b>dlnkmgr online</b> command	27
Identifying the Auto Path driver volumes	27

## Index 31



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# About this guide

This guide provides information about configuring the HP StorageWorks Auto Path for AIX software for supported HP disk arrays.

Auto Path requires Hitachi Dynamic Link Manager (HDLM) software. This guide is a supplement to the *Hitachi Dynamic Link Manager User's Guide*.

Before installing Auto Path, refer to the **readme** file for instructions and restrictions. The procedures described in this guide and the **readme** file supersede the instructions provided in the *Hitachi Dynamic Link Manager User's Guide*. The GUI information in the *Hitachi Dynamic Link Manager User's Guide* does not apply.

## Intended audience

This guide is intended for use by system administrators who have expertise with the associated systems and software and knowledge of these topics:

- data processing concepts
- disk arrays and RAID technology
- operating system commands and utilities

## Disk arrays

Unless otherwise noted, the term *disk array* refers to these disk arrays:

- HP Surestore Disk Array XP48
- HP StorageWorks Disk Array XP128
- HP Surestore Disk Array XP256
- HP Surestore Disk Array XP512
- HP StorageWorks Disk Array XP1024
- HP StorageWorks XP12000 Disk Array
- HP OpenView Continuous Access Storage Appliance (CASA)

## Related documentation

HP provides the following related documentation:

- *HP StorageWorks Disk Array XP128: Owner's Guide*
- *HP StorageWorks Disk Array XP1024: Owner's Guide*
- *HP StorageWorks XP12000 Disk Array Owner's Guide*
- *HP StorageWorks Command View XP for XP Disk Arrays: User Guide*

Refer to the manufacturer's documentation for information about operating system commands and third-party products.

## Conventions

This guide uses the following text conventions.

<a href="#">Figure 1</a>	Blue text represents a cross-reference. The reference is linked to the target in the online version of this guide.
<a href="http://www.hp.com">www.hp.com</a>	Underlined, blue text represents a website on the Internet. The reference is linked to the target in the online version of this guide.
<b>literal</b>	Bold text represents application names, file names, menu items, dialog box titles, buttons, key names, field names, and values that you type exactly as shown.
<i>variable</i>	Italic type indicates that you must supply a value. Italic type is also used for manual titles.
input/output	Monospace font denotes user input and system responses, such as output and messages.
<i>Example</i>	The word “example” in italics denotes an example of input or output.
[ ]	Square brackets indicate an optional parameter.
{ }	Braces indicate that you must specify at least one of the listed options.
	A vertical bar separates alternatives in a list of options.

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If you still have a question after reading this guide, contact an HP authorized service provider or access our website:

[www.hp.com](http://www.hp.com)

## HP technical support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support:

<http://h18006.www1.hp.com/storage/arraysystems.html>

Be sure to have the following information available before calling:

- technical support registration number (if applicable)
- product serial numbers
- product model names and numbers
- applicable error messages
- operating system type and revision level
- detailed, specific questions

For continuous quality improvement, calls may be recorded or monitored.

## **HP storage website**

Visit the support website for the most current information about HP StorageWorks XP products:

<http://h18006.www1.hp.com/storage/arraysystems.html>

Consult your HP account representative for information about product availability, configuration, and connectivity.

## **HP authorized reseller**

For the name of your nearest HP authorized reseller, you can obtain information by telephone:

United States      1-800-345-1518

Canada      1-800-263-5868

Or contact: [www.hp.com](http://www.hp.com)

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## Revision history

January 2004	Minor update for product version 04.03
August 2004	Update for version 04.40
November 2004	Minor update for product version 04.40-/B

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## Warranty statement

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# Installation

This chapter describes how to install HP StorageWorks Auto Path for AIX for use with HP disk arrays.

Use these instructions instead of the procedures provided in the *Hitachi Dynamic Link Manager User's Guide*.

# Installing Auto Path in AIX environments

Before beginning installation, configure the AIX environment for Auto Path support, conforming to the following requirements:

- Make sure you have a license key or a license file containing a license key.
- After you create DLM devices, use only **dlm** commands for these devices. Do not use standard operating system commands. For example, use **/usr/DynamicLinkManager/bin/dlmmkvg** instead of **/usr/sbin/mkvg**.
- After creating a volume group on a DLM device, do not reference the underlying hdisk (as displayed with the **lsdev** command).

Auto Path can be configured to issue an error when the underlying hdisk is referenced using the **dlmodmset** command. See the *Hitachi Dynamic Link Manager User's Guide* for more information.

- Persistent reservation must be disabled when using Auto Path with a Continuous Access Storage Appliance (CASA).

All paths to the same LUN must have the same type of HBA with identical firmware.

## Caution

*If you combine different types of HBAs, Auto Path may not be able to switch the path when an error occurs.*

- Auto Path cannot be used to manage the boot disk.
- Uninstall any versions of Auto Path older than 04.02 before installing the current software version. See “[Upgrading to version 04.40-/B](#)” on page 21.
- Auto Path cannot be used to manage command devices used by RAID Manager.

*Recommendation* Use the same type of fiber switch for all paths.

## **System prerequisites for using the Auto Path software**

This version of Auto Path works with the AIX 4.3.3, AIX 5.1, and AIX 5.2 operating systems. Refer to the Auto Path User's Guide or the **readme** file on the release media for minimum maintenance and patch levels required for Auto Path to operate properly. Additional patch level requirements apply if you also run HACMP and GPFS.

## **Disk array firmware and software dependencies**

See the **readme** file on the Auto Path for AIX CD for firmware revision and software version requirements.

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# Installation procedure

Configure the disk array LUNs to be accessible through at least one port in each cluster of the array—one port in CL1 and the other in CL2.

Make the appropriate connections between the host HBAs and the disk array ports.

Configure host bus adapters (HBAs) and switches. See the HBA product documentation for the configuration method and settings. Verify that the Fibre Channel connection method (such as Fabric or AL) matches the settings.

The following setting must be made when using a Fibre Channel switch with AIX 5.1 and AIX 5.2 operating systems. Do this for each Fibre Channel instance.

*Example*      `chdev -l fscs1X -a fc_err_recover=fast_fail`

*Note*      Do this before creating hdisk device definitions. Failover times can take up to 30 minutes if this setting is not made.

*Important*      Auto Path will not install if the above steps for connecting to an XP array are not completed and hdisk definitions representing XP LUNs are not present on the system.

Install VisualAge C++ (version 5.0.0.0 or later) filesets on the host if required. AIX 4.3.3 software may be obtained at:

<http://www-1.ibm.com/support/docview.wss?org=SW&doc=4001173>

For AIX 5.1 and AIX 5.2, the software components are available on their respective install media.

## To install Auto Path:

1. Log in as root.
2. If a license key file has been provided, save it as the following file:

```
/var/tmp/hd1m_license
```

Otherwise, enter the license key as follows:

Create the **/var/DLM** directory:

```
# mkdir /var/DLM
```

*Example*

```
# echo "123456789ABCDEF" > /var/DLM/dlm.lic_key
```

where “123456789ABCDEF” is the license key number.

*Optional*

Use a text editor to enter the key in the **/var/DLM/dlm.lic\_key** file.

3. Insert the CD into the drive.

There is no need to mount the CD.

4. Execute the install command:

```
# installp -aXgd /dev/cd0 all
```

Alternatively, you can specify the special file of the installation medium in place of **/dev/cd0**.

5. Verify that the package was installed:

```
# lslpp -L AutoPath.rte
```

Verify that **AutoPath.rte** appears among the file set items in the output list and that its status is C (Commit). See the **readme** file on the Auto Path for AIX CD for the current level.

6. (*Optional*) Add the PATH environment variable to the execution environment:

*Bourne shell or  
Korn shell*

```
# PATH=$PATH:/usr/DynamicLinkManager/bin  
# export PATH
```

*C shell*

```
# set path=( $path /usr/DynamicLinkManager/bin )
```

If you want, you can edit the **PATH** statement in the root **.profile**.

7. Define the physical volumes to be managed by Auto Path.

If you want to let the DLM driver recognize all volumes that can be managed by the DLM driver, this step is unnecessary. Continue with step 9.

To limit the volumes to be managed, you may either specify the volumes to be managed or specify the volumes you do not want managed.

*Example*

**To specify the volumes to be managed**, enter the logical names of these volumes (hdisks) in the configuration file:

```
/usr/DynamicLinkManager/driv/dlmfdrv.conf
```

Enter all hdisk references for paths to the same LUN. If only volumes hdisk5 and hdisk7 are used with Auto Path and reference paths to the same LUN, **dlmfdrv.conf** will contain the following:

```
hdisk5  
hdisk7
```

*Note*

When booting from a Fibre Channel device, the boot device (usually **hdisk0**) must be placed in the **dlmfdrv.unconf** file or be configured so as to be excluded from Auto Path's control.

*Example*

**To specify the volumes to not be managed**, enter the logical names of these volumes (hdisks) in the **unconf** file:

```
/usr/DynamicLinkManager/driv/dlmfdrv.unconf
```

If physical volumes hdisk4 and hdisk6 are not to be recognized by the DLM driver, **dlmfdrv.unconf** will contain the following:

```
hdisk4  
hdisk6
```

If **dlmfdrv.unconf** and **dlmfdrv.conf** do not exist, the Auto Path configuration manager automatically creates the instances of the devices for all of the disks supported by Auto Path.

8. Execute the Auto Path configuration manager command:  
**# dlmcfgmgr**
9. Verify that the Auto Path subsystem (DLMManger) is active:  
**# lssrc -a | grep DLMManger**  
A system reboot also activates the Auto Path subsystem.
10. Verify that the Auto Path drivers (**dlmfdrvn**) and alert driver (**dlmadrv**) are installed on an active kernel and available.

*Example*

```
# lsdev -C | grep dlm
dlmfdrv0 Available HDLM Driver
dlmadrv Available HDLM Alert Driver
.
.
.
dlmfdrv1 Available HDLM Driver
dlmfdrvio Available HDLM Driver
```

In this example:

**dlmadrv** is the special file name of the Auto Path alert driver.

**dlmfdrvio** is the driver instance for internally managing Auto Path.

**dlmfdrv0** and **dlmfdrv1** are the special file names of Auto Path drivers. Each driver instance represents all paths to the same LU. The Auto Path driver name does not relate to the hdisk or LU names. The instances start with **dlmfdrv0** and increment sequentially.

Verify that all Auto Path drivers representing the disk array LUNs you want recognized are displayed. If one or more drivers are not displayed, AIX error information is logged to the following file: **/var/DynamicLinkManager/log/dlmcfgmgr1.log**. For details about the log file, see the AIX documentation.

11. Create a volume group.

To specify a physical volume group, specify the Auto Path device representing the LU.

*Example*

If hdisk4, hdisk5 and hdisk6 are in the same LU and represented by Auto Path device file dlmfdrv1:

```
# dlmmkvg -s 32 -y dlmvg01 dlmfdrv1
```

*Recommendation* Use a SMIT Window for volume operations. For SMIT Window information see the *Hitachi Dynamic Link Manager User's Guide*.

12. Verify the volume group:

```
# dlmlsvg
```

13. Create a file system.

*Example* To create a file system having the size 8192000 at the mount point **/tmp/dlmvg01\_fs** for the dlmvg01 volume group:

```
# crfs -v jfs -g' dlmvg01' -a size='8192000'  
-m'/tmp/dlmvg01_fs'
```

14. Make the mount point available.

*Example*

```
# mount /tmp/dlmvg01_fs
```

15. Verify the mount point:

```
# df -k
```

---

# Upgrading to version 04.40-/B

*Recommendation* Make a backup copy of data stored on the system before making changes (such as this upgrade) to the file systems.

Be sure that all 04.40-/B prerequisite conditions are met before proceeding with the upgrade.

Halt all activity with the file systems for the duration of the upgrade.

Versions older than 04.02 must be uninstalled before you install version 04.40. This includes removing the **/opt/hitachi/HNTRLib** files. Check the Auto Path for AIX User Guide for steps to uninstall the older version.

For versions 04.02 or later, it is not necessary to uninstall the previous version of Auto Path.

## To upgrade:

1. Unmount all Auto Path file systems.
2. Deactivate all Auto Path (HDLM) volume groups.

*Example*

```
# dlmvaryoffvg dlmvg01
```

3. Save the **dlmfdrv.conf** or **dlmfdrv.unconf** file to a safe place.

*Example*

```
# cp /usr/DynamicLinkManager/drv/dlmfdrv.conf /tmp
```

4. Remove the Auto Path devices created with the previous version:

```
# dlmrmdev
```

5. Ensure that the **fscsin** attribute **fc\_err\_recover** is set to **fast\_fail**. Perform the following steps if needed:

- a. This step removes the **fscsi** device and all of the **hdisk** definitions that are associated with this path. Record the LUN associations before proceeding so you can verify that the **hdisk** definitions correspond to the volume group definitions.

```
# rmdev -l fscsin -R
```

- b. Change the attribute **fc\_err\_recov** of the parent device (**fscsin**) to **fast\_fail**.

```
# chdev -l fscsin -a fc_err_recov=fast_fail
```

- c. Confirm that the setup of the parent device (**fscsin**) to **fast\_fail** is effective.

```
# lsattr -El fscsin
```

*Example*

```
fc_err_recov fast_fail FC Fabric Event Error
RECOVERY Policy True
```

6. Make sure the license key is in the **/var/DLM/dlm.lic\_key** file, or a **/var/tmp/hdml\_license** file is present.

*Important*

Make a backup of this file. The version 04.40 installation will delete this file and the **/var/DLM** directory.

7. Insert the Auto Path 04.40 CD into the drive. There is no need to mount the CD.

8. Execute the install command:

```
# installp -aXgd /dev/cd0 all
```

Alternately, you can specify the special file of the installation medium in place of **/dev/cd0**.

9. Verify that the package was installed:

```
# lslpp -L AutoPath.rte
```

Verify that **AutoPath.rte** appears among the file set items in the output list and that its status is C (Commit). See the **readme** file on the Auto Path for AIX CD for the current level.

10. Verify that the **dlmfdrv.conf** or **dlmfdrv.unconf** file is in the **/usr/DynamicLinkManager/drv** directory.

11. Activate the Auto Path subsystem:

```
# dlmcfgmgr
```

A system reboot also activates the Auto Path subsystem (DLMManager).

The dlmfdrv device files are regenerated as configured in the **dlmfdrv.conf** or **dlmfdrv.unconf** file.

12. After verifying that hdisk to LUN associations are correct, activate all of the Auto Path (HDLM) volume groups.

*Example*      `# dlmvaryonvg dlmvg01`

13. Make the mount point available.

*Example*      `# mount /tmp/dlmvg01_fs`



# 2

---

## Operation

This chapter provides information about Auto Path operations with HP disk arrays.

---

# Setting the automatic failback feature using the **dlnkmgr** command

Use the **dlnkmgr** command to set up automatic failback.

```
dlnkmgr set -afb { on [-intvl Interval_Time] | off } [-s]
```

The **dlnkmgr** command sets whether automatic failback is used for failed paths. The default setting is **off**.

**-afb**      Specify whether or not automatic failback is used for failed paths.

**on**      Automatic failback of the failed paths is performed at a specified interval. The recovered path is returned online.

**off**      Automatic failback is not performed.

**-intvl**      Specify the time interval for automatic failback with a value between 1 and 1440 (minutes). When no value is set for this parameter, the value previously set or 1 minute (default) is used for failback processing. When automatic failback is newly turned on, or the Auto Path manager is activated. The first automatic failback is performed after the duration interval specified.

Settings on automatic failback remain after the system is turned off and restarted. The interval value is maintained even after automatic failback is turned off. The stored value is used when automatic failback is set on again and no value is set for the interval at that time.

Only the paths containing an error are subject to the automatic failback operation.

The paths reporting errors when the Auto Path manager is activated are also included in the automatic failback operation.

With the addition of the automatic failback, only normal paths are subject to health check.

## Error indication on the last path

When the state of the paths is displayed with **dlnkmgr view –path** command, the last path for a device remains online. It does not go offline even if an error occurs. The path containing an error is now indicated as Online(E).

- The Online(E) path returns online if input and output can be successfully executed.
- The **dlnkmgr online** command or automatic fallback returns the Online(E) path online only.

## Using the **dlnkmgr online** command

If **–pathid** is not specified in the **dlnkmgr online** operation, all the paths in hold state are subject to online processing. If there is a path that cannot be recovered, the following message is output:

```
A path which failed to go online was detected during
online operation of the KAPL01039-W DLM command. Do
you want to continue the PathID = %d online
operation? [y/n]? Enter "y" to continue the
operation, or "n" to abort it.
```

When **–s** is specified, the operation is continued on the assumption that "y" is specified.

You can execute the **dlnkmgr view –path** command to show the status of the LUN paths.

```
# dlnkmgr view –path
```

## Identifying the Auto Path driver volumes

To view the hdisks that belong to a dlmfdrv device, execute the following command:

```
# dlnkmgr view –drv
```

# Commands for operations with Auto Path volume groups

Auto Path cannot use disks that are recognized by AIX unless you take some special measures. Auto Path provides utility commands for operations on Auto Path volume groups.

A volume group created using the commands from Auto Path can be used only for Auto Path. The Auto Path utility commands for operations with Auto Path volume groups correspond to the commands executed in the SMIT screen “HDLM Volume Group.”

You can execute Auto Path volume group utility commands from the command line or in the SMIT screen.

The format of each Auto Path utility command is the same as the format of the corresponding AIX command. The return values are the same as those of the corresponding AIX commands.

The error messages and Help output for the commands from the Auto Path volume group utility commands are the same as those of the corresponding for AIX commands.

If you perform volume group operations on Auto Path volume groups without using the Auto Path volume group utility commands, the volume group may become invalid. In this case, use AIX commands to correct this situation. (See the example.)

*Recommendation* Use SMIT when you use the Auto Path volume group utility commands. When you use SMIT to select physical disks, SMIT displays only the first physical disk registered in ODM. This allows you to easily specify the physical disks allocated for Auto Path of the same LU, all at one time.

*Related information* See the *Hitachi Dynamic Link Manager User’s Guide* for the commands to be used on Auto Path (DLM) volume groups.

A volume group managed by Auto Path must contain only dlmfdrvXX designations. Do not include an hdisk definition in an Auto Path volume group.

When you use an Auto Path volume group command, specify the AIX name (for example, hdisk1) as the physical volume name. However, after you have performed operations on the volume group, the volume name is changed to an Auto Path name (for example, dlmfdrv1).

Do not specify any volume group other than a volume group created using the Auto Path volume group utility commands. Doing so may cause the volume group to become invalid.

*Example* Create a volume group for Auto Path:

```
# dlmmkvg -s 32 -y dlmvg1 dlmfdrv2 dlmfdrv3  
  
# dlmlsvg
```

*Invalid volume group* For a volume group used by Auto Path that includes an hdisk:

```
# dlmlsvg -p dlmvg1  
dlmvg1:  
PV_NAME PV STATE TOTAL PPs FREE PPs FREE  
DISTRIBUTION  
dlmfdrv2 active 542 36 00..00..00..00..36  
dlmfdrv3 active 542 36 00..00..00..00..36  
hdisk4 active 542 36 00..00..00..00..36
```

See the *Hitachi Dynamic Link Manager User's Guide* for commands to correct the condition, as well as the complete set of Auto Path (HDLM) volume group utility commands.



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# Index

## A

alert driver 19  
audience, intended 5  
authorized reseller, HP 8

## B

before installation 14

## C

commands for volume group operations 28  
conventions, documentation 6

## D

dependencies 15  
disk arrays, supported 5  
dlm commands 14  
dlmodmset command 14  
dlnkmgr command 26  
dlnkmgr online command 27  
dlnkmgr view -path command 27  
documentation  
    conventions 6  
    related 6

## E

environment variable, PATH 17

## error

    indication 27  
    messages 28  
    path 27

## F

failback feature, automatic 26

## H

HBA 14  
help output 28  
help, obtaining 7  
Hitachi Dynamic Link Manager User's  
    Guide 13  
HP  
    authorized reseller 8  
    technical support 7

## I

install command 22  
installation 13-23  
    preparation 14  
    prerequisites 15  
    procedure 16  
    verifying 17

## L

license file 14, 17, 22

license key 14, 17, 22

## O

operation 25–29

## P

PATH environment variable 17

path error 27

persistent reservation 14

physical volumes 18

## R

related documentation, list of 6

## S

software dependencies 15

system administrator, required knowledge 5

## T

technical support, HP 7

## U

upgrading to version 04.03 21

## V

verify installation 17

volume group, creating 29

volumes to be managed 18

volumes, physical 18

## X

XP1024, support for 5